PLM Overview from a Defense Perspective

Module: Standards-based Product Lifecycle Management for Army Ground Systems at US Army Tank Automotive R&D Engineering Center (TARDEC)

Challenges for Product Lifecycle Management (PLM) from a Government/Defense Perspective

[√]DETAILS

CASE STUDY

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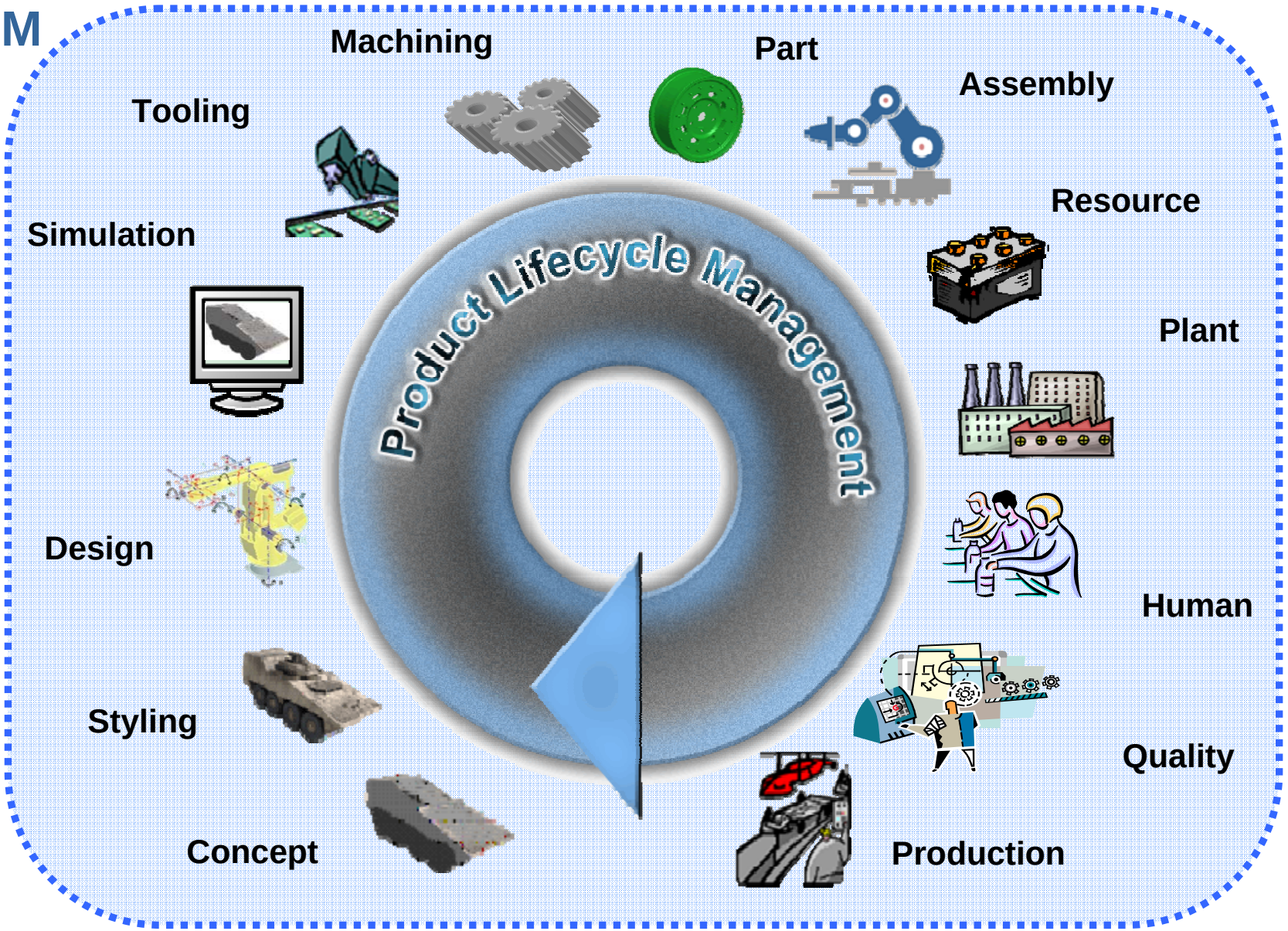
PLM Overview from a Defense Perspective

This lesson will take you through the following topics and by the end of this lesson you will be able to:

1. Describe the Army's vision of Product Lifecycle Management.
2. Understand who are the participants involved in the Army's PLM planning.
3. Understand the Army's historical context and the areas the Army covers.
4. Understand the Army's motivation and driving factors toward PLM.
5. Describe the potential value of the Government / Army to have an entire Life Cycle Management Command (LCMC).
6. Consider today's product data challenges the Army faces.
7. Describe the Army's current work system and the proposed PLM system.
8. Understand the Army's benefits and constraints in implementing PLM.
9. Understand the Army's data organization in a collaborative PLM environment.

Introduction

PLM



TARDEC's Vision and History

US Army Tank Automotive R&D Engineering Center

TARDEC

TARDEC Mission and Vision

MISSION: **TARDEC provides full service life cycle engineering support to the TACOM Life Cycle Management Command and its Program Executive Offices to develop and integrate the right technology solutions to improve the effectiveness of the current force and realize the superior capability of the future force to facilitate Army transformation.**

VISION: ***TARDEC is the first choice of technology and engineering expertise for today's and tomorrow's ground vehicle systems and support equipment.***

TACOM - Supporting Army Readiness

SUPPORT

Capital Value of TACOM Equipment $81.7B

2993 Fielded Systems Supported

> 26,000 Components

PRODUCT LINES

- Combat Vehicles
- Trailers
- Materiel Handling Equipment
- Fuel & Water Dist Equipment
- Chemical Defense Equipment
- Howitzers
- Mortars
- Machine Guns
- Aircraft Armaments
- Rail
- Fuel & Lubricant Products
- Tactical Vehicles
- Construction Equipment
- Tactical Bridges
- Sets, Kits & Outfits
- Shop Equipment
- Large Caliber Guns
- Rifles
- Ammunition
- Demolitions & Explosives
- Watercraft
- Non-Tactical Vehicles

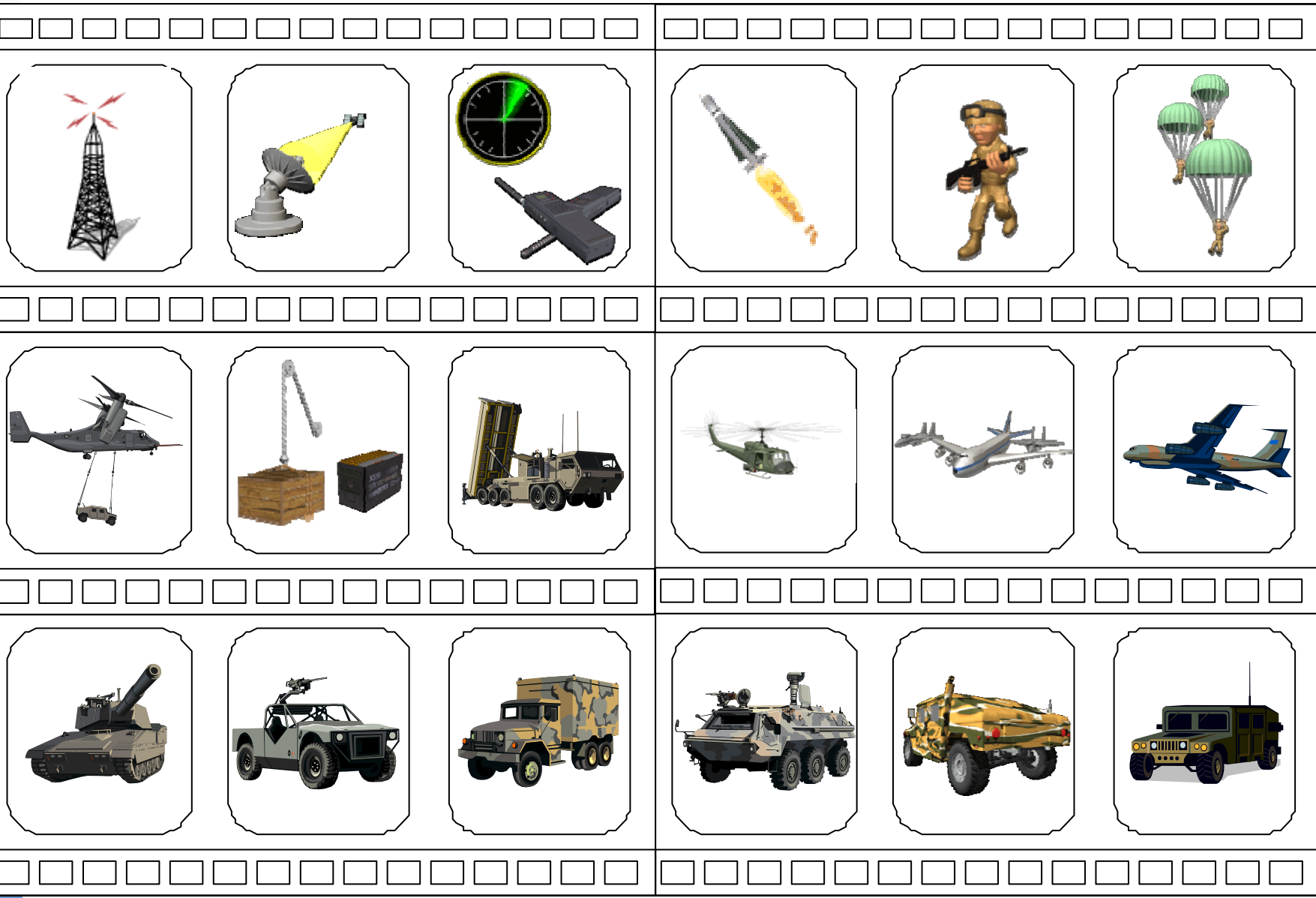
Plus Technology Development for the Objective Force

MAGNITUDE

141 Allied Countries own TACOM Equipment

All Army Parent UICs Contain TACOM Supported Equip

What the Army encompasses



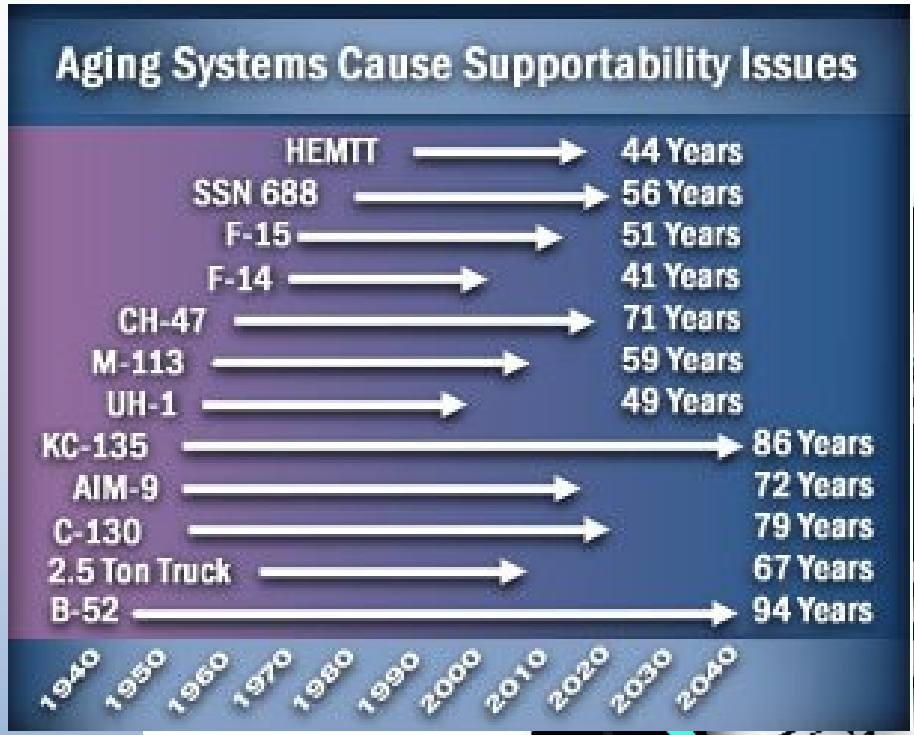
The vision for PLM

All large corporations have goals and objectives to remain efficient and profitable. The Army is an enormous government corporation that must be efficiently managed "**To be the best that they can be**."

To be "**the best**," the Army's vision is to develop and integrate technology, processes and policy for the management of lifecycle of a weapon system and its associated data from cradle to grave. To enable data exchange and collaboration between the Army and Original Equipment Manufacturers (OEM), the Army will use federated architecture and standards for interoperability and enterprise integration.

Federated **A**rmy **L**ifecycle **Co**llaborative e-**N**terprise

Historical context



Part

mbly

Resource

Human

Quality

35 - 70 YEARS

Stylin

Concept

Production

Motivation and Driving Factors

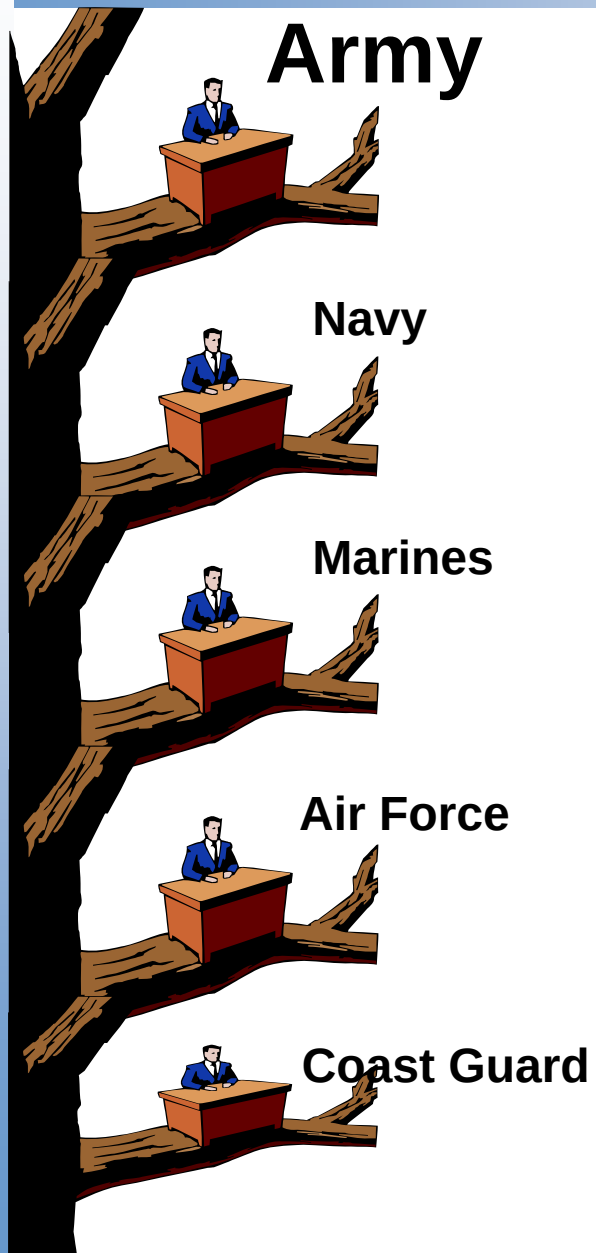
Who is in the driver's seat?

"Why is the Army making these changes relating to weapon systems support?"

The Army is following guidance and policy from the Department of Defense (DoD) that is encouraging the Army to transform into the future objective force. The driving force for PLM implementation in the Army begins with the weapon system Project Managers that have to support the DOD's Total Lifecycle System Management (TLCSM) concept, and work collaboratively within the Life Cycle Management Command (LCMC) construct. A parallel reason for the push is for better Performance Based Logistics that emphasizes readiness metrics to gauge the performance of systems.

To support these initiatives the Army views themselves as a large corporation and wants to implement commercial standards and best practices the large OEMs are beginning to implement. To enable data exchange and collaboration between the Army and its OEMs, the Army intends to implement federated architecture, standards for interoperability, and enterprise integrations to its system.

Who is in the lead?



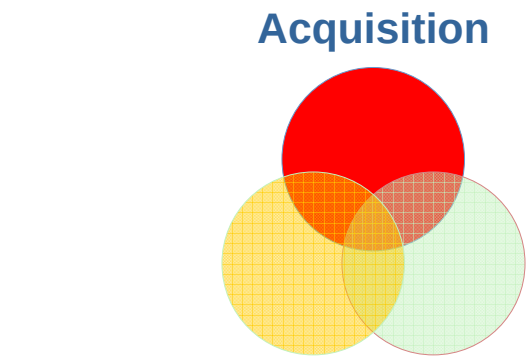
Is the Army the only one working on implementing PLM?

All branches of the DOD have embarked on a mission to implement PLM. The Army's enterprise PLM implementation will be accomplished through the implementation of the Single Army Logistics Enterprise (SALE). TARDEC is implementing PLM in support of the ground systems program managers at the TACOM LCMC. TARDEC is also collaborating with the Office of Secretary of Defense at the Pentagon in ensuring that the appropriate policies and standards are being implemented. As a PLM pioneering organization within DOD, TARDEC has the opportunity to share its lessons learnt with other organizations across the DOD to help reduce their cost of implementation.

Why is it important for government to have an entire PLM command?

Why is it important for the Army to have an entire PLM Command?

The Army reorganized into the Life Cycle Management Command construct to enable the lifecycle support to weapon system at reduced sustainment costs. The Program Manager ultimately has the overall responsibility of a weapon system from cradle to grave, but working collaboratively in an LCMC organization, the PM now has the ability to share this responsibility with other organizations within the Command. This integrates the Acquisition (program management and procurement), technology (research, development and engineering) and Logistics (sustainment) functions to enable lifecycle support to the weapon systems.



Motivation and driving factors

What is motivating and driving the Army toward a PLM solution?

To start with, many of the current ground weapon systems will continue to be in service for another 20 to 30 years. These current ground weapon systems continually need to be sustained after production.

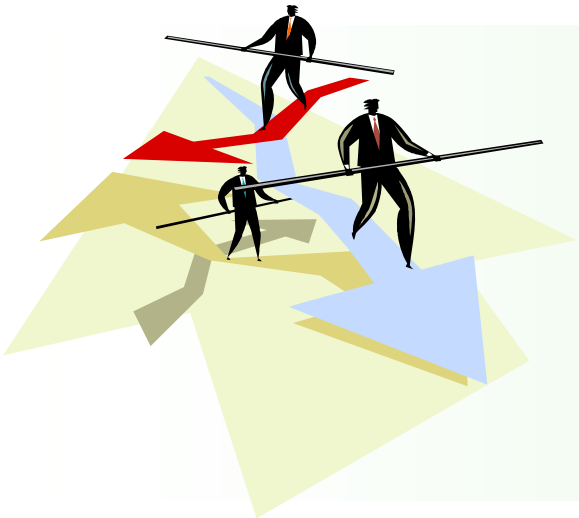
It is also important to reduce the sustainment costs to these current ground weapon systems with the following:

- Performance Based Logistics which emphasizes access to product data on demand and in real-time directly from OEMs or Product Support Integrators
- Need of technical data to support rebuild and overhaul efforts at depots to meet surge requirements from Global War on Terror (GWOT)
- Validated product data critical to the success of various Army logistics modernization efforts such as Single Army Logistics Enterprise (SALE)
- GWOT rapid fielding projects requiring validated product data on-demand in real time often, and as often as 365/24/7; finally
- Improving readiness by moving towards zero lead time

The Army's product data challenges of today

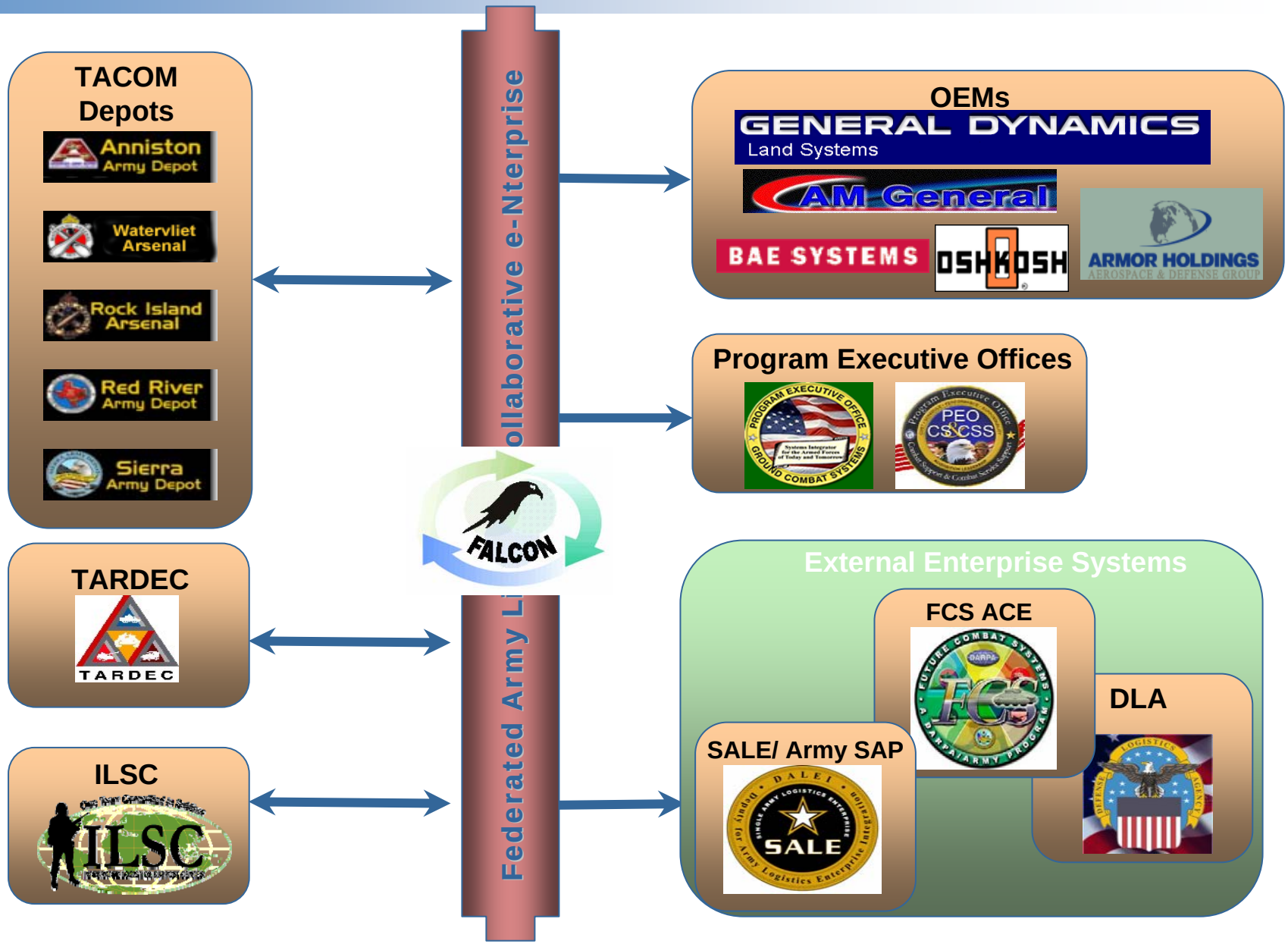
The following are just a few of the product data challenges the Army faces. This list demonstrates why it's imperative for the Army to an enterprise PLM strategy, such as:

- The Army's product data is distributed among organic organizations and OEMs as weapon system moves through its lifecycle;
- Silos of data have no enterprise visibility;
- There are inconsistencies and inaccuracies resulting from disconnected data elements between engineering and logistics;
- There is duplication of data;
- There is a lack of integrated end to end configuration management through lifecycle;
- Product data formats and systems to manage product data are not standardized – interoperability issues;
- Importance of rights to technical data are not being recognized to enable reduction in lifecycle costs;
- Product data is still delivered primarily in lowest common raster-based drawings formats even when OEMs are using 3D CAD models;
- Data exchange and collaboration among organizations is inefficient and time consuming – data continues to be delivered on CDs; and finally,
- Many of the product data processes, both engineering and logistics, are still based on "digital paper."



An Overview of the Proposed PLM System

Overview of the players



FALCON architecture for TACOM

Federated **A**rmy **L**ifecycle **Co**llaborative e-**N**terprise

Key Technology and Process Enablers

- Lean Six Sigma based business process re-engineering
- Intelligent model-based definitions for product data
- Federated system of systems for product data management
  1. Integrated and logically unified lifecycle product data
  2. Single virtual repository for data
  3. Enterprise search and view capability
  4. Access to validated master data at source
  5. Multiple views of same integrated data depending on function
- ISO 10303-239 Product Life Cycle Support (PLCS) standards for product data semantic interoperability
- Web services standards such as SOAP/XML for enterprise integration and data synchronization
- Unique Identification for configuration management and tracking – as-designed, as-built, as-maintained
- Built on Windchill PDM Link 8.

How the process currently works

How the process currently works

This is how the Army's process currently works. The following shows the requirements from each organizations and how it is handled.

Warfighter Requirement
Training & Doctrine Command
TRADOC

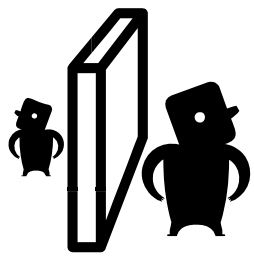
R&D
Like TARDEC
Responsible for the Initial concept and technology

System Development
OEMs are responsible for design and build

Fielding and Support
Use to be done by Major Support Command (MSC's), TACOM is one MSC

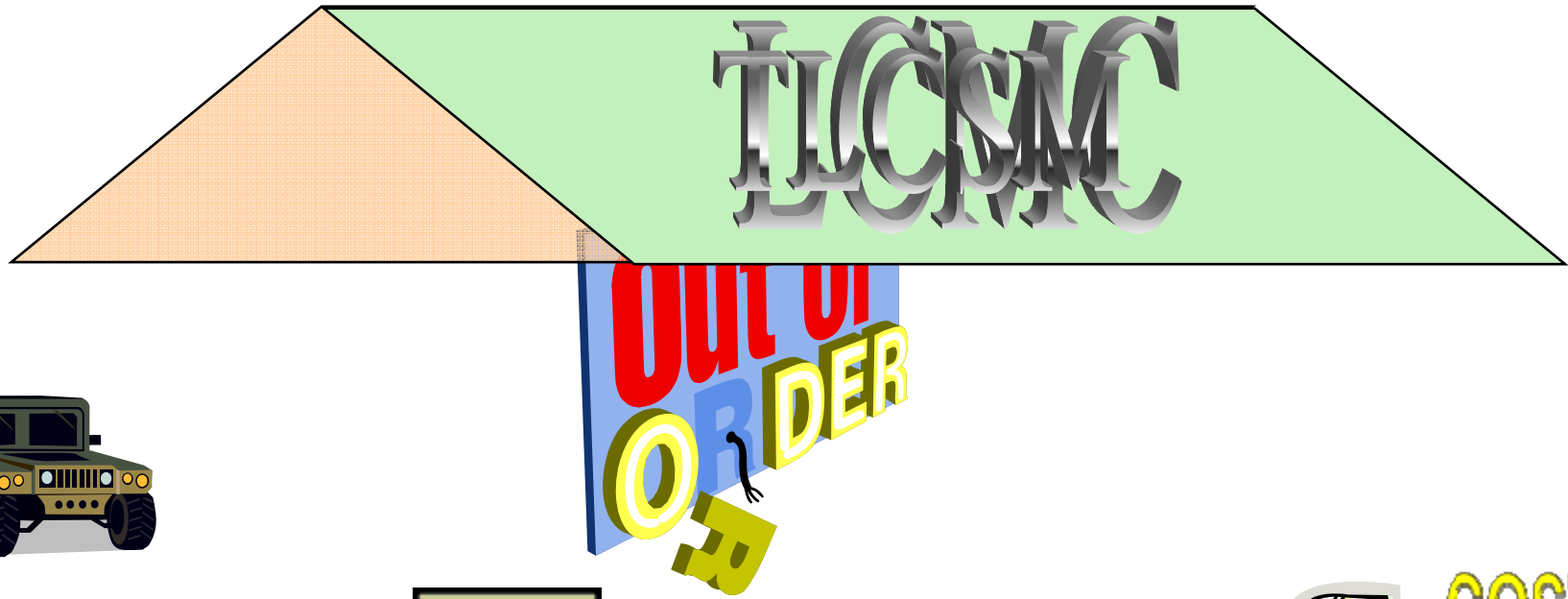
Move into disposal

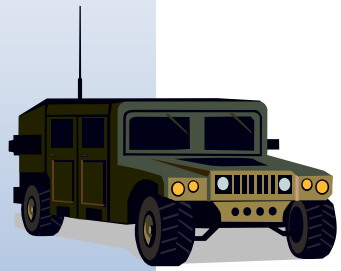
Technical data transitions between organizations through the lifecycle as various organizations assume primary responsibility for the system



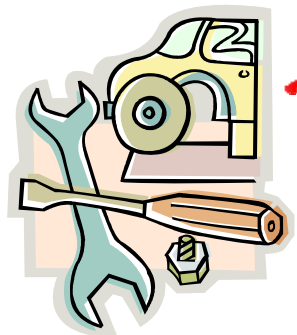
No one organization looked at the entire lifecycle perspective, and that lead to the lifecycle costs going up.

An example why PLM is necessary





COST



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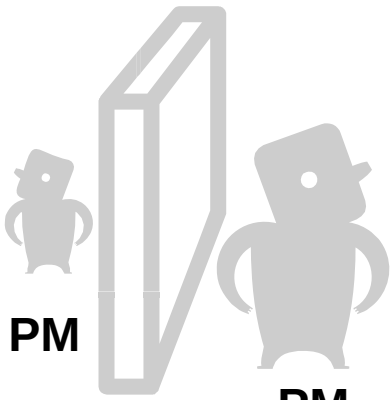
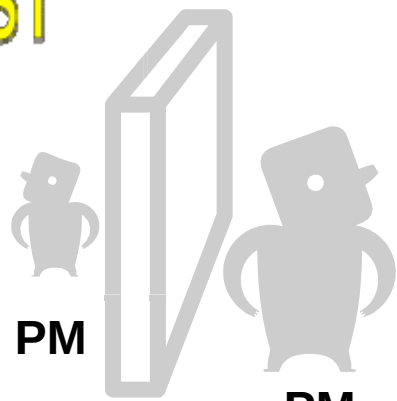


PM

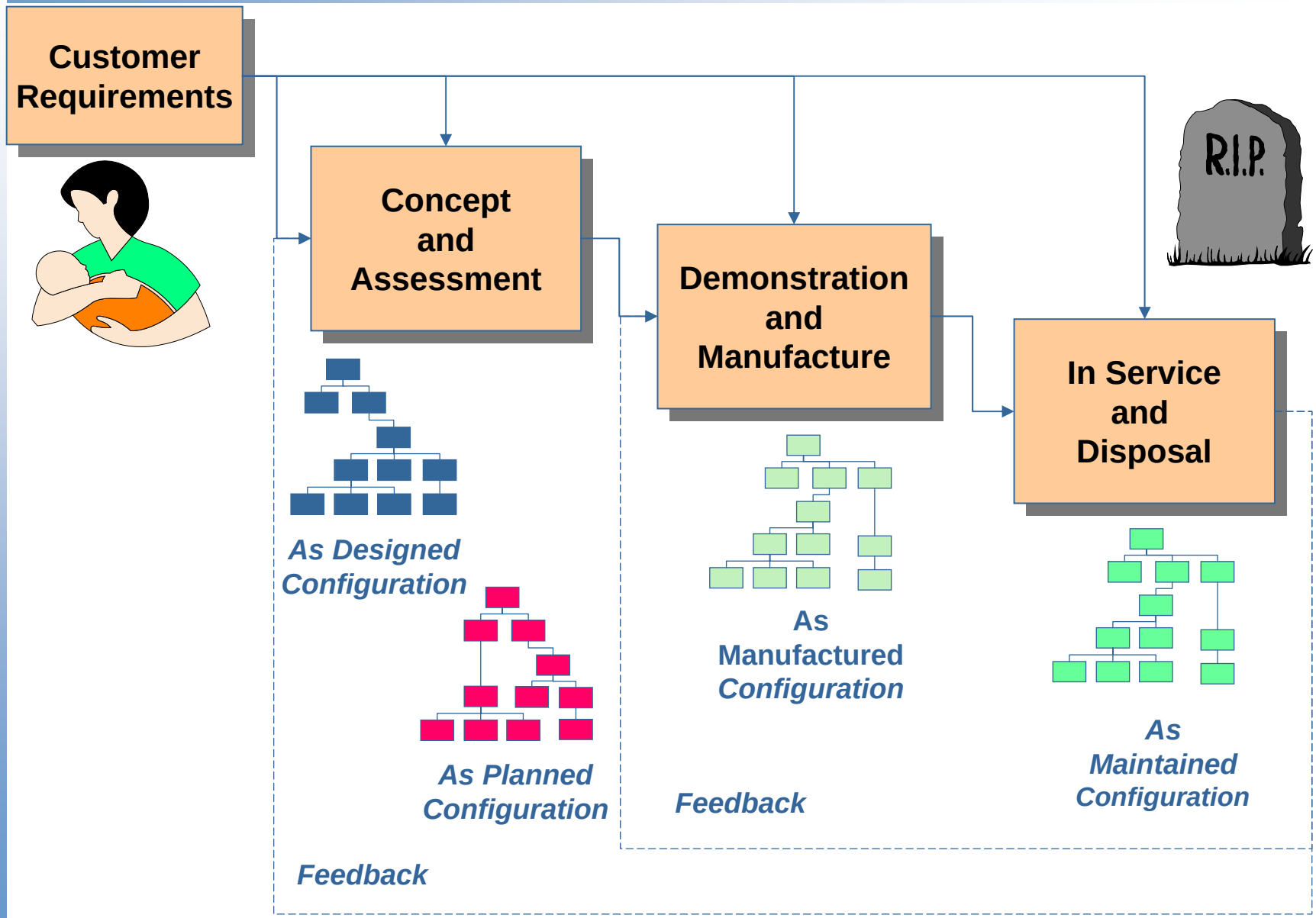
PM



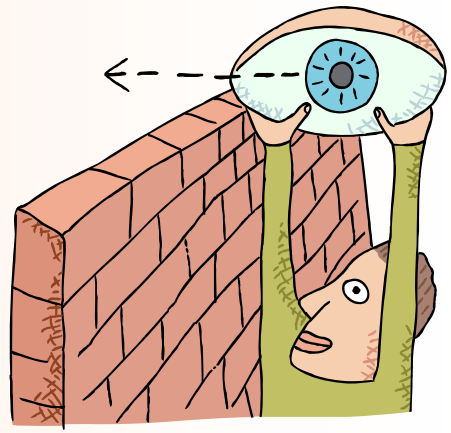
PM

PM

The Configuration Management Challenge



How the proposed PLM system will work



How the proposed system will work

Windchill

The Army is currently in a Pilot mode making incremental changes to its processes. The Army is planning the next generation for Lifecycle Product Data Management or PDM, and this will be the foundation for the Army's PLM. PLM is important to the Army because it will provide control over readiness and costs of weapons systems.

PTC's Windchill will be the PDM foundation for TACOM's PLM. The process will start out on a micro level and slowly extend out to collect more functionality till macro implementation is accomplished. TACOM envisions an integrated PLM solution that works for their ground and land weapon systems community. Once this has been accomplished and verified this information will then be made available to the other branches of service for adoption and integration.

The need for standards

- It is clear that a number of PDM and logistics systems have to be integrated as part of a total Army PLM solution. Many excellent commercial Enterprise Application Interfaces (EAI) middleware solutions are available today to connect these enterprise solutions, but they have three major drawbacks-
- They are proprietary one-to-one mappings between enterprise solutions. Such interfaces add an additional level of proprietary to the existing systems making them difficult to manage and maintain.
- They are version dependent and have to be migrated along with upgrades to the systems being integrated. When there are a number of systems being integrated this can turn into a very complex problem.
- They are very expensive to develop and maintain. Each interface can costly upward of $1 million to develop and an additional $300,000 per year to maintain. Table 1 below shows the exponential effect on cost with reference to the number of systems being interfaced.

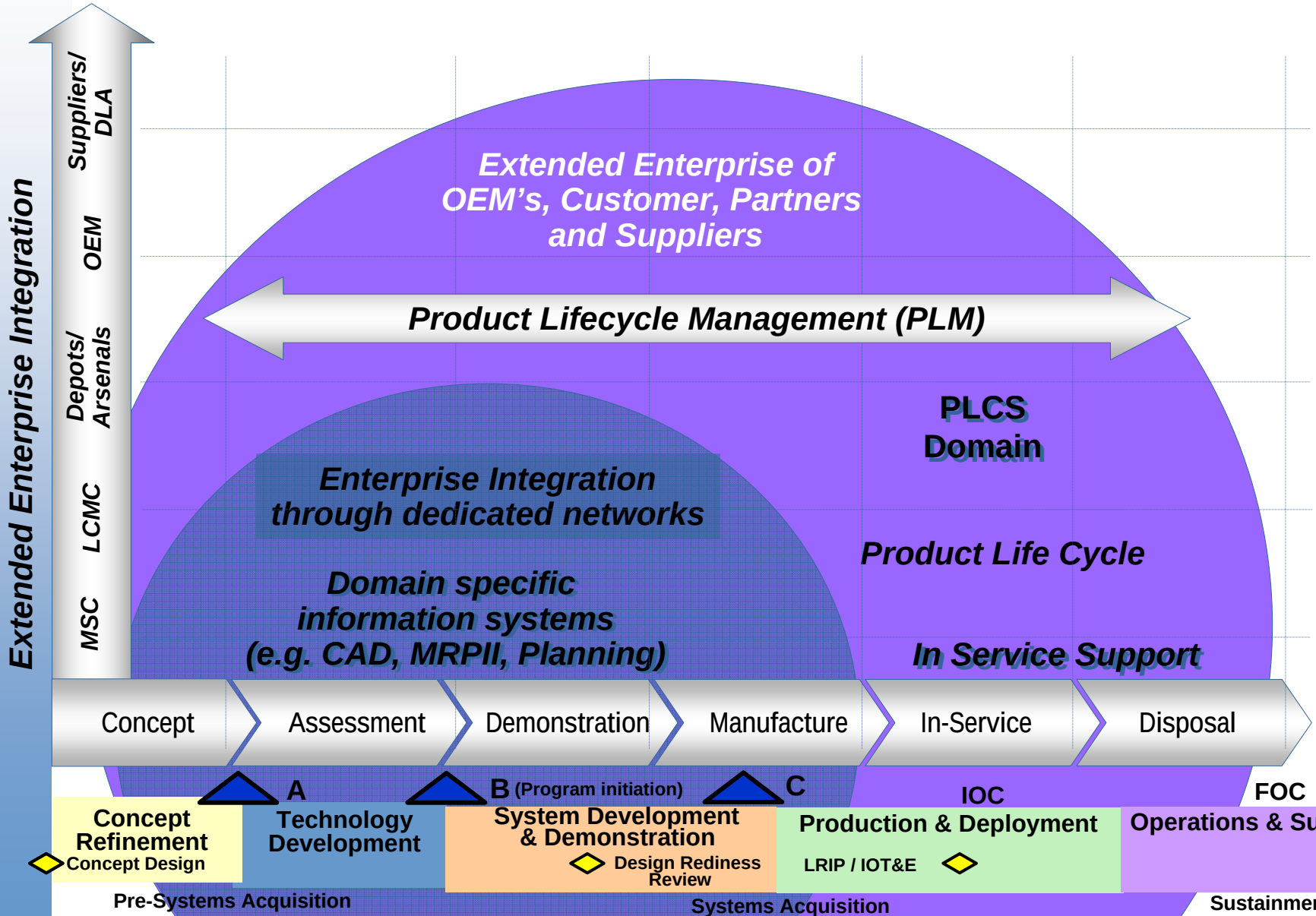
The ISO 10303 STEP standards

- STandard for Exchange of Product data (STEP) officially known as ISO 10303 has emerged as a clear standard for product data. Comprised of several Application Protocols (APs), the standard has the fidelity to completely represent product data through the lifecycle of the product. The figure 4 above maps the various STEP APs to different phases of the DoD acquisition lifecycle. Although STEP is a comprehensive standard representing product data in a number of vertical domains such as ship building, construction and plant design, the APs relevant to the design and manufacture of Army weapon systems fall into four broad categories – design, analysis, manufacturing and data management. Many APs for Computer Aided Design such as AP203 and AP214 are already extensively used in industry. The AP in specific that are relevant to the TACOM's PLM implementation are AP214cc6 (PDM Schema) and AP239 (PLCS).

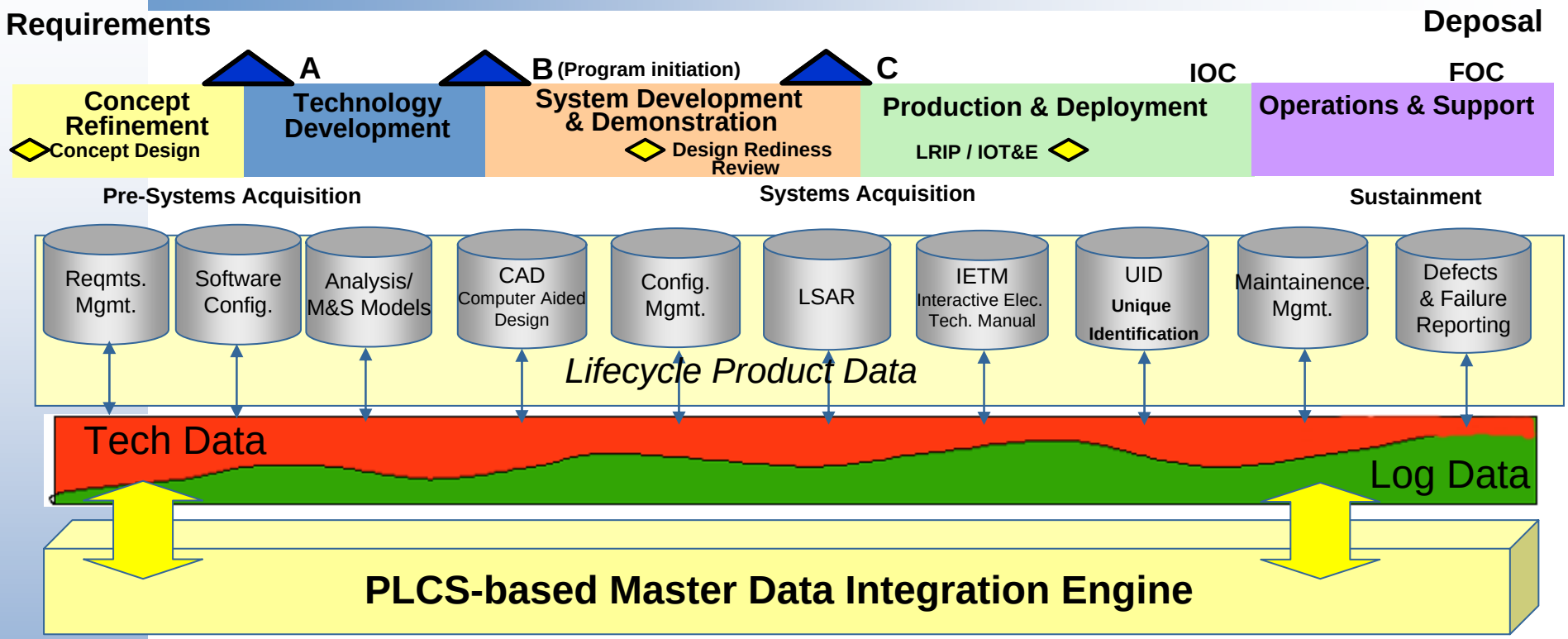
Product Life Cycle Support (PLCS)

- International Standard for exchange of product support information - based on ISO 10303 STEP
- Complete product life cycle - from concept to disposal
- Single source of assured product and support information
- Data Independence – Freedom of choice for processes, software applications and data format
- Interoperability across enterprises and applications through:
  - Integrated suite of data models
  - Utilization of ISO STEP standards
  - Facilitating data exchange and information sharing
- Extensibility through the use of Reference Data libraries

Internet-based architecture and federated data models



Lifecycle Product Data Integration



Lifecycle Applications

Collaboration	Product Improvements		Spare Part Buys	DLA Buys	Depot Reset/ Recap
Modeling & Simulation	CAVE	Online Design Reviews		Provisioning	
Configuration Management	Data Validation	What-if Analysis	Readiness Prediction	Cataloging	Field Repair & Maintenance

Lifecycle Applications Supported

- Managing concept and modeling and simulation models and analysis results in a simulation management environment
- Real-time collaboration and project management for online design reviews.
- Managing released “as-designed” drawings and models.
- End-to-end configuration management of technical data (Engineering Change Process)
- Tech data validation for spare parts procurement through TACOM and DLA
- CAVE based war fighter training, space claim analysis and human factors engineering
- Validated tech data package for depot overhaul and rebuild
- Store and manage manufacturing process plans and NC code for depot manufacture
- Parts provisioning and cataloging using solid models
- Manage “as-built” and “as-maintained” configurations using UID
- On-demand IETMs and repair instructions generated automatically from solid models
- Prognostic and diagnostics data from vehicle on-board sensors
- Tracking problem reports and maintenance history
- Proactive product improvement based on field feedback and failure history

Benefits and Constraints of Implementing PLM

Benefits of implementing a PLM System

Benefits

It is clear that the Army's PLM solution is complex and expensive. In spite of the uniqueness issues and challenges, it is important to leverage the best available commercial off the shelf systems where possible to avoid expensive customization and development. It is also important to leverage commercial best practices, open architectures and standards to enable interoperability between the Army and the various OEMs and suppliers worldwide. Standards such as STEP have the potential to represent and manage product data throughout the lifecycle of the product. This will enable engineering product data management systems to feed product data to logistics solutions such as the Army's Single Army Logistics Enterprise. This will in turn provide the required data to the war fighter for activities such as spare parts manufacturing, and repair and maintenance in support of current operations.

The SALE architecture describes the end state vision for weapon system lifecycle management for the Army. The SALE supports multiple PLM environment (enterprise, project, and program), and provides the Army the flexibility required to manage the lifecycle without standardizing on a single commercial PLM software solution.

Constraints of implementing a PLM System

Information security

The Army has many concerns with integrating PLM into their system; such as, “Will the benefits out weigh the constraints and the concerns?” One of the primary concerns is how will the Army control and protect sensitive information in regard to their weapon systems.

The first drawback is, the Army perceives security is built-in and the contractors are an extension of them. The challenge to this line of reason is on account of a new evolving business environment and a change in operating systems within the Government and Army. The Government and Army is now seeing the results and the problems of outsourcing and over-contracting of its operational weapon systems. Contractors’ by nature are profit motivated. Research currently shows that this may not be the right approach for controlling costs and quality of the Army’s operational weapon systems.

Proprietary rights to data

The second recognized drawback, is that the rights to technical data and proprietary engineering data of operational weapon systems are held by the OEMs for many systems. This issue occurred because the Army did not secure up-front the data rights to many of its weapon systems. The Army was primarily concerned with performance of its weapon systems as mandated by the DOD's Performance Based Logistics strategies. Since the OEMs still have all the technical data and proprietary engineering data rights, when the Government and the Army goes back for an update on a weapon systems, they are forced to deal with a single source OEM for this data. The OEM, who holds that data can now dictate new terms and increase the costs for the updates. There is reduced competition because the Army cannot bid a contract on proprietary data rights held by an independent OEM.

People constraints

The Army is still in a PLM strategy, prototyping and piloting mode and they are making incremental changes toward a PLM solution. A big piece of the puzzle in a successful PLM implementation is its people. What issues is the Army's encountering with their personnel as they move toward the PLM solution? So far, the Army has not had training issues but they are definitely running into personnel and process issues. PLM involves computer data integration and only people can convert that data information into knowledge.

Another crucial key in creating a successful PLM system is for Army's management to provide an opportunity for people to work together. Typically, this is an Army's management issue, as the resources are not always available when required across organization lines.

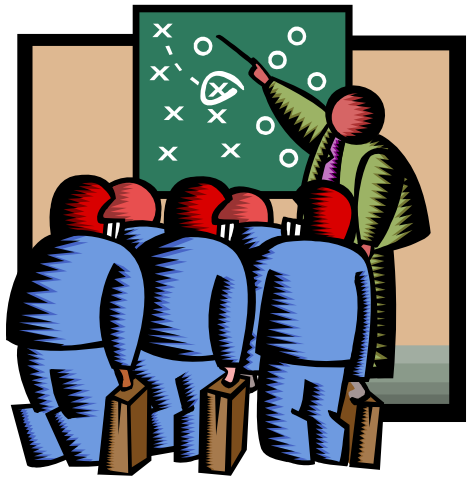
One of the essential keys for success in the PLM system is how people work within its framework. This success does not happen overnight and the only way the Army will see its benefits is through encouragement and motivation. Trust and responsibility in Project Managers' relationships will develop over time. Dialogue and working together helps the process and ultimately people know when and how to interact.

Paper process versus PLM

One of the Army's process challenges is how to deal with legacy data. Some of the processes has not changed in 30 years. Even though the Army has moved from paper process to digital files, data exchange still happens using CDs. A PLM environment requires a collaborative data exchange environment.

PLM may not change a person's job function, but the approach and the tools they use will be different. The Army's personnel resistance to these changes is about a 50/50 percent split. Some units comply easily with the new process, while other have a harder time, thereby creating a bottle neck in the change process. The Army's management needs to resolve the resource and change process issues by encouraging their personnel to work across organizational boundaries and give them the time necessary to set new objectives and to encourage collaboration.

Process change



The Army is currently employing a process re-engineering tool called Lean Six Sigma. This tool maps a process and develops a value stream analysis to determine why and what steps are required in a given process. The analysis provides valuable information in reducing steps in a process. Also, this analysis helps determine if certain steps are still necessary in a given process as a result of PLM implementation.

The Army is working in parallel with both process engineering and technology implementation in order to change their current business process. This change is a slow process because the Army must first be convinced it will work.

Data requirements and formats

How important is technology in enhancing the Army's ability to pull it all together?

The Department of Defense, or DoD, had very strict requirements and instructions on how data formats were to be delivered in the past. Over the last 10 years most military standards for data formats have been cancelled and the Army is starting to use its commercial best practice standards. The general Government and Army's consensus thinks it's in the Army's best interest to change their standards to commercial best practices.

This change is not necessarily incorrect, but this change may not be defining and meeting all of the Army's data requirements. Also, the change in requirements and standards is emerging as a larger job because the data is not in the Army's format, but a new one. Learning, understanding, and transferring the new data format is time consuming and costly, but offers clear advantages in the long term.

Compatibility issues

Both the Army and OEMs are sharing issues of incompatible systems and processes. The incompatibility issues are creating inoperable data systems and are due to the multitude of different operational systems, contractors, and data formats. Currently the Army, like their counterpart OEMs, are standardizing their processes and systems, while implementing PLM, in order to cut costs and stay competitive in today's market.

Data Types

Is the Army able to specify the type of data files for their designs; or does the Army have to cope with the OEMs or contractor's interface and in-house technology infrastructure?

The Army's Project Manager would prefer to not receive product data files from systems with a multitude of data formats and non-standardized formats.

For this reason on many Army programs, the OEMs maintains and manages the data in their system and format. Today, the Army's data is widely distributed since the Army does not have a central repository and cannot store vast amount of data. The data storage and site location selection is the Project Manager's responsibility. This provides the Army with additional cost control because data management is expensive. Also, the OEMs typically have the best commercial systems to store data files. But the Army is still concerned about what set up the OEMs built-in as back-up measures for its data. For example, will the Army have real time access to pull its data or will the OEMs approach be to deliver the data to the Army's system? This is an issue the Army is exploring while they integrate PLM into their system.

PLM Technology Suites Solutions

There are many current technologies ready to handle the Army's PLM solution. But in reality, integrating PLM product suites with other PLM suites that are currently in the marketplace is the Army's primary challenge. Cooperation from OEMs, contractors, and vendors in the integration of these PLM suites is not easy. To get the most out of the PLM suite of tools, skilled people must be willing to work together as a collaborative team. People must effectively utilize the tools' capabilities to achieve efficiency and profitability in manufacturing.

Federated Architecture and Product Data Standards

Services for exchange

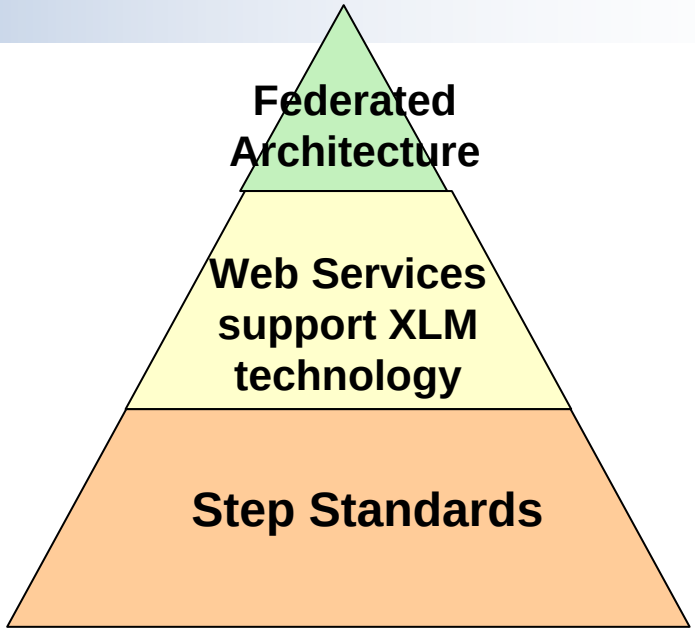
The following is a list of questions to consider to determine the Army's Services for data exchange.

- How much data needs to be exchanged between systems?
- What type of file is it? A PDF file or 3D CAD file?
- How often do you want the data exchanged or synchronized? Everyday or every week?
- Will these files be synchronized, continuous, or in real time?
- Where are these systems located?
- Who has access to these files? What if they are all from different services?

ISO 10303 STEP Standards do not answer many of these questions. It is a neutral representation of the data to be defined by using Services on top of the STEP Standards to give it the intelligence for data handling. Federated architecture is more conceptual. Every data source is a master and there is no single master repository; since every other system is a potential client, more like a peer to peer type network than a client.

How does this architecture work?

The pyramid to the right shows how STEP Standards are used as the foundation of the architecture followed by web services, and then Federated Architecture. This approach is used to solve enterprise integration issues since Web Services support XML technology.



STEP standards help define the common specifications for data. The ISO community is developing it. STEP standards are being used and being supported by many companies; like PDES Inc., a consortium of companies including Boeing, Raytheon, Lockheed Martin, General Dynamics and Northup Grumman.

RI1

STEP Standards

STEP Enables Complete and Accurate Data Exchange and Use

STEP is a key international product data technology that effectively enables:

- interoperability
- supply chain integration
- web-based collaboration
- life-cycle management

By removing the barriers that prevent maximum flexibility in design, manufacture, and support processes, STEP enables manufacturers to achieve new, higher levels of quality and

STEP Enables Reuse of Design, Planning and Manufacturing Data

STEP standard data definitions deliver the capability for the reuse of information in different applications, such as design, analysis, manufacturing, and support, as well as data retention, throughout the entire life cycle of a product. Using STEP, companies' business processes can be streamlined. Large manufacturers, small and medium size enterprises, software developers, and systems integrators can capitalize on STEP.

STEP provides a standard way to accurately and efficiently exchange complete electronic product information. Today, STEP use is growing throughout the world within many industries, including:

- aerospace
- automotive
- shipbuilding
- electronics
- process plants
- construction

A wide variety of interoperable

STEP Enables Consister Timely Data Sharing by Par

STEP allows companies to effe exchange information with their worldwide partners, customers suppliers, as well as internally. improvement strategies such as concurrent engineering, enterpr integration, and electronic comm significantly benefit from the use STEP and have a broader impa enterprises.

STEP applications include:

- computer-aided design
- process planning
- computer-aided manufactu
- product data management
- web content standardizati

Slide 47

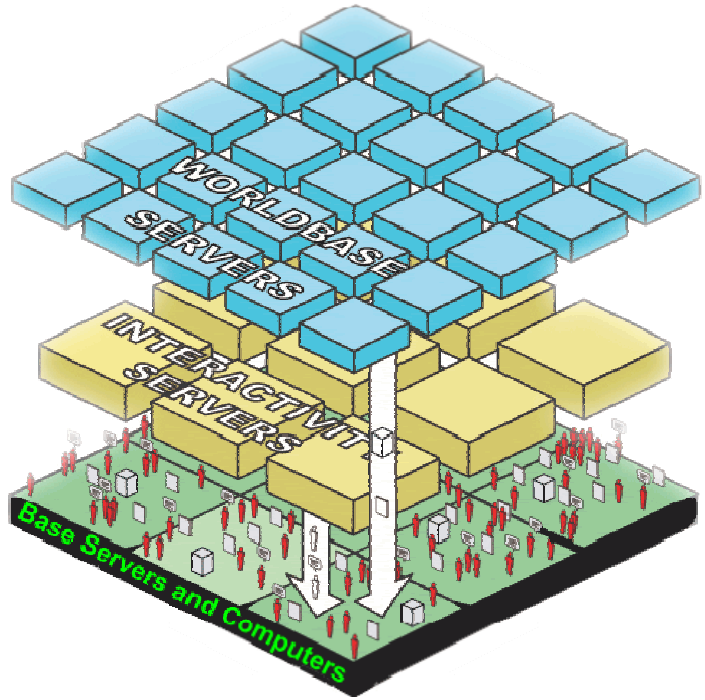
RI1 This graphic is incorrect. It does not reflect STEP.
Dr. Raj Iyer, 3/12/2007

Federated Architecture

What is a Federated Architecture?

In the simplest terms, Federated architecture is an overall system architecture that accommodates multiple data systems, operational data stores, reporting systems, analytical applications, etc.

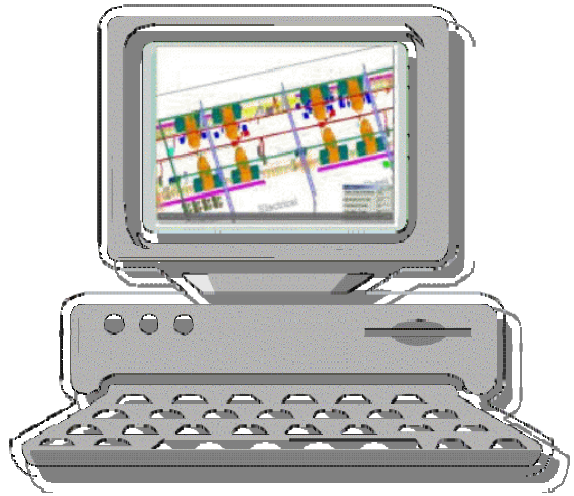
For example, as the Internet is viewed as a network of networks, so is Federated Architecture viewed as an architecture of architectures. It provides a framework to the greatest extent possible for the data integration of its data system management and analytical application systems.



Data Organization in a Collaborative Environment

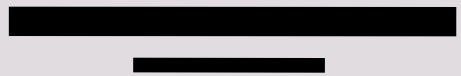
Who's responsibility?

In the past, when a Project Manager decided to build a weapon system, their primary responsibility ended when they sent the weapon system was fielded. Over the last few years, responsibility issues in the operations and support phases forced the DoD to look at the performance and readiness of its weapon systems using metrics reliability or readiness analysis. The Army focused on a single metric that defines the readiness of a weapon system. The question became: "Is the weapon system in readiness and what is its uptime?" This question takes you to the Army's solution, Performance Based Logistics.



What is Performance Based Logistics?

With Performance Based Logistics, the Army is no longer concerned with a weapon systems development method. Instead, the Army's new approach is giving the Project Manager total responsibility for the readiness of a weapon system based on its performance. This whole new concept provides the Project Manager with the authority to decide how and who is going to supply and deliver support to a given weapon system to achieve the maximum readiness level. For example, now a Project Manager, who is totally responsible for a weapon system can use organic support or send it back to the OEM. The Project Manager can also go to their choice of product support integrator to achieve the criteria of readiness and reliability on the weapon system label.



A mix collaborative environment

The Army's focus has changed from an in-house support to more of a mix collaborative environment. This provides the opportunity to share data, even data from the reliability metrics.

The Army wants the ability to demand real time access to its data from across multiple sources of information. The ability to access this information will provide the primary requirements in supporting PLM implementation and integration. For example, the Army would be able to see the answers to the following questions in real time:

- How do I know contractor is giving me 90% reliability?
- How were the metrics calculated?

The Army also wants to be able to locate, access, integrate, and check accuracy on all data information on its weapon systems. But this process takes time and access rights are difficult. The Army's vision of PLM is integrating all its weapon system's lifecycle data from their sources, as well as keeping it current, synchronized, and available to all personnel.

Reliability Metrics

Cutting lifecycle costs was the original objective in using the metric for Reliability. If the Army does not provide consistent parts reliability, its costs increase. Costs increase when the Army purchases spare parts for frequently failing weapon systems. Costs also increase with logistic issues, such as shipping spare parts out to the field. An example is the Depot may send out three parts, hoping one will make it to the field. It's a logistic challenge to transfer the right spare part to the field in time.

Logistics Support Analysis Record or LSAR records the repairs, maintenance, purchase, and the number of personnel servicing a weapon system. The following explains UID and IETM.

- Unique Identification or UID is how parts and systems are numbered uniquely and tracked through the lifecycle.
- Interactive Electronic Technical Manual or IETM defines training and repair instruction for a system.

Change Management or Configuration Management

Change Management or Configuration Management is the Army's biggest challenge across a weapon system's lifecycle.

For example: If the Army or OEM makes a design change to part as a result of an Engineering Change Proposal (ECP), it needs to be successfully propagated to all the affected users. So, if PTC's Windchill is updated with data then others connected to their data system will receive the data updates. But what happens to the outside contractors or OEMs who are not connected and/or notified of Windchill 's data changes and updates? This is a challenge propagating change across multiple proprietary systems since they do not interoperate. PTC's Winchill and TACOM are re-architecting its processes based on ground up information to support this process.

Windchill

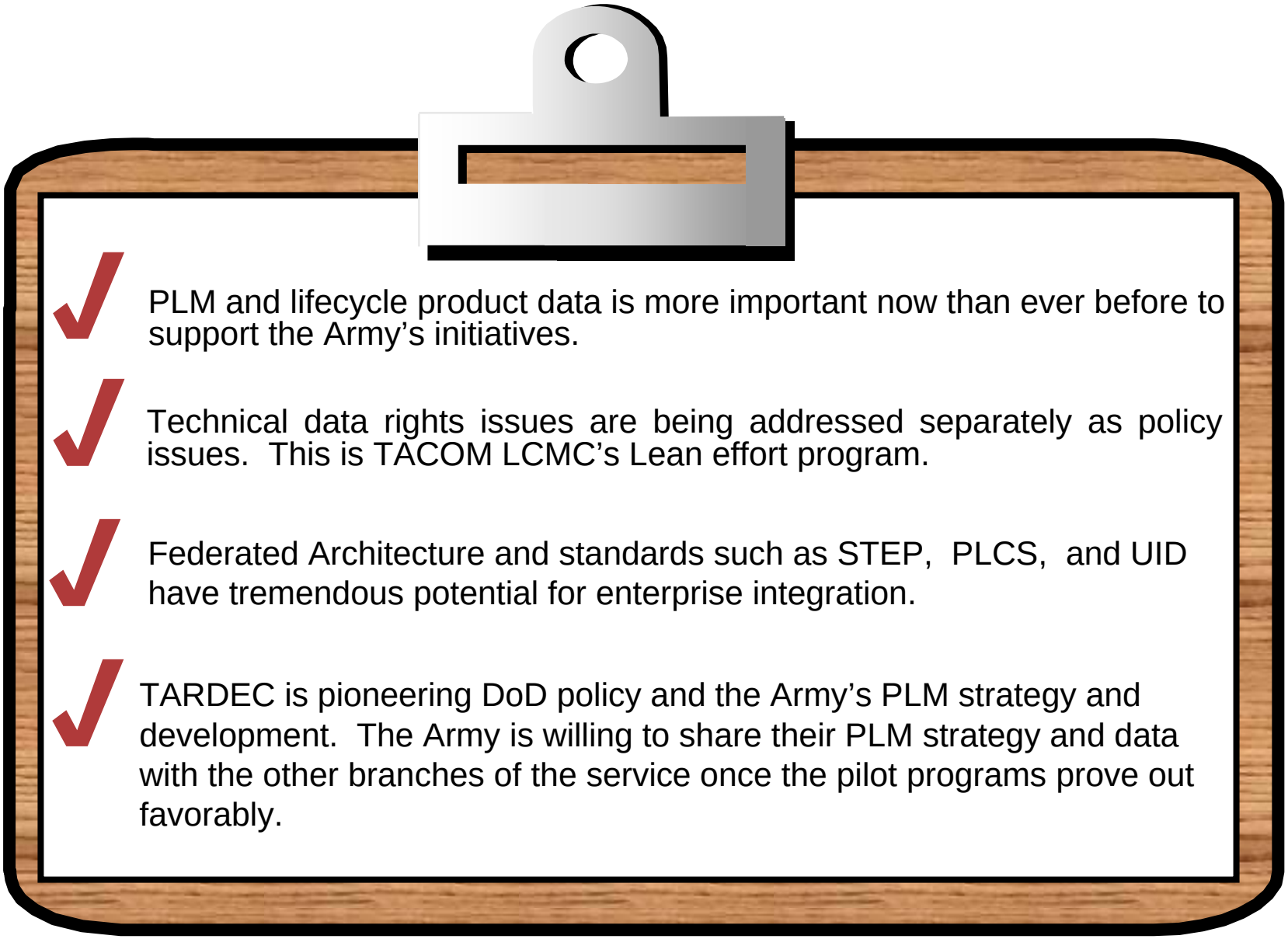
Defense Logistic Agency (DLA)

Another major component the Army must consider while implementing its PLM, is how will it collaborate and conduct business with the Defense Logistic Agency or the DLA? The DLA is a separate DOD organization and is NOT part of the Army; but it purchases approximately 80% of TACOM standard parts using a totally different parts purchase system based on SAP. The DLA and TACOM systems, processes, and change management must coincide with each other for PLM to work.

Supporting Cast of Players

Your successful outcome and what you have learned

What you can use from this experience



- PLM and lifecycle product data is more important now than ever before to support the Army's initiatives.
- Technical data rights issues are being addressed separately as policy issues. This is TACOM LCMC's Lean effort program.
- Federated Architecture and standards such as STEP, PLCS, and UID have tremendous potential for enterprise integration.
- TARDEC is pioneering DoD policy and the Army's PLM strategy and development. The Army is willing to share their PLM strategy and data with the other branches of the service once the pilot programs prove out favorably.

Resources

Module: Standards-based Product Lifecycle Management for Army Ground Systems

Here is some additional information about tools, technologies, and results we referenced in this module.

Additional Resources

- Headquarters Army Materiel Command, www.amc.army.mil/G3
- TACOM LCMC, www.tacom.army.mil
- ISO 10303-239 (PLCS), http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=plcs
- ISO TC184/SC4, Industrial Data Standards (STEP), http://www.sc4online.org/
- DOD Defense Acquisition Guidebook, http://akss.dau.mil/dag/
- Performance Based Logistics, https://acc.dau.mil/CommunityBrowser.aspx?id=18074
- Total Life Cycle Systems Management, https://acc.dau.mil/CommunityBrowser.aspx?id=32741
- International Journal of Product Lifecycle Management, http://www.inderscience.com/browse/index.php?journalID=139
- PDES Inc., http://pdesinc.aticorp.com

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- **Background:**

Dr. Iyer leads the Product Lifecycle Management development efforts at TARDEC. He has over 15 years of academia, private sector and federal Government experience relating to product data interoperability and standards relating to CAD/CAM, PDM and PLM. He has authored over two dozen publications on the subject as well as presented at numerous conferences worldwide. Dr. Iyer supports several other federal agencies such as the Office of Secretary of Defense and NASA as a PLM subject matter expert. He is the DOD's voting member to the ISO SC4 Industrial Data standards association as well as the Army's representative to the Executive Board of Directors in PDES Inc. He also serves on the editorial committee of the International Journal of PLM.

Academic Credentials:

- **Ph.D., The University of Texas, 1997**
- **M.S in Electrical Engineering, The University of Texas, 1994**
- **Certified Lean Six Sigma Greenbelt**

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Background:

Mr. Adlam has been employed at the U.S. Army Tank-automotive and Armaments Command since 1972 in leadership positions with involvement in every phase of acquisition for army equipment. Since Jun 2001, his current responsibilities are the modernization and management of TARDEC's technical data and to lead in the implementation of a Product Lifecycle Management System for TARDEC. Between May 2001 and June 95 he served as as Executive Director for Virtual Prototyping. Prior to his employment with the government, Mr. Adlam was employed in the engineering design area of the automotive industry.

Academic Credentials:

Mr. Adlam received a Bachelor of Science degree in Electrical Engineering from Oakland University, Rochester, Michigan in 1972. He also earned a Masters of Science in Mechanical Engineering from Wayne State University, Detroit, Michigan, in 1975. At present he is enrolled at Andrews University and is pursuing a Doctorial degree in Leadership.

The end of PLM Overview from a Defense Perspective

Module: Standards-based Product Lifecycle Management for Army Ground Systems